

## Contact Width Analysis of Corrugated Metal Gasket Based on Surface Roughness

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**Abstract.** Contact width is important design parameter for optimizing design of new metal gasket. The contact width was found have relationship with helium leak quantity. Increasing axial force, the contact width will increase and helium leakage will decrease. This study we conducted the surface roughness evaluation of 25A-size metal gasket before and after use. The results denote the real contact width after contact with flange having different surface roughness. The real contact width for the flange having smoother surface roughness is wider than the rougher one.

### Introduction

As a replacement for gaskets containing asbestos material, many researchers have studied the use of metal gasket materials. Saeed *et al.* studied a new 25A-size corrugated metal gasket that was developed as an asbestos gasket substitute. The gasket had a metal spring effect and produced high local contact stress to create a sealing line with a flange. The results showed that the contact stress and contact width were important design parameters for optimizing the gasket performance [1]. Haruyama *et al.* [2] continued this research. The size limit of the contact width as a gasket design parameter was investigated. Comparing the results of FEM analysis of the relationship between the clamping load of the flange and the contact width with experimental results for the clamping load and leakage clarified the contact width with no leak for the new 25A-size metal gasket. Based on this result, the contact width can be used as a main parameter to optimize the gasket design. The leakage can be reduced by increasing the contact width. Nurhadiyanto *et al.* [3] used FEM to study the optimization of gasket design based on an elastic and plastic contact stress analysis by considering the forming effect. A helium leakage test showed that a gasket based on a plastic contact stress design was better than a gasket based on an elastic stress design.

The characteristic becoming important in next development target of new metal gasket is a function to prevent a leak depending on use a surface roughness standard. Leakage is a function of surface roughness [4]. If surface roughness increase, leakage also increases. Haruyama *et al.* [5] studied a contact width, contact stress, and force per unit length for gasket in contact with a flange having different surface roughness levels using FEM. A smoother of surface roughness has higher slope for force per unit length. The higher slope suggests that the gasket and flange are pressed together strongly. Based from the reason, the aim of this study is determine the surface roughness of a flange contact with metal gasket. It realized by experimental analysis to check the contact width after tightening process according to surface roughness of flange. After the axial force applied, the grooves will be formed in the gasket adjusted the shape of the flange roughness. Focus of this study is investigated the total number of grooves width formed in a gasket. The total number of grooves width is the real contact width during the tightening.